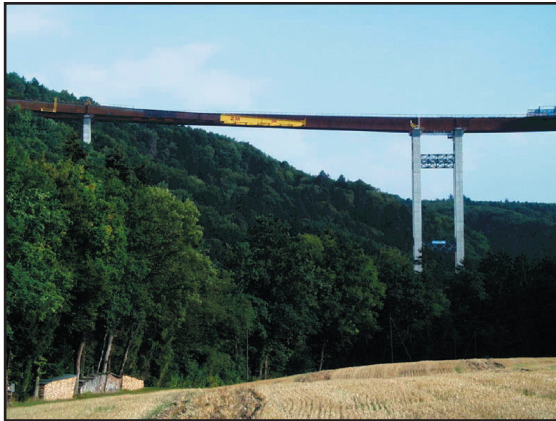
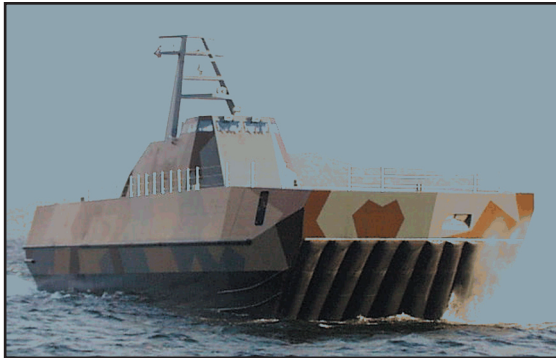


High-Performance Structural Sensors



| | High-Performance NRL Fiber Sensor | Typical NRL Fiber Sensor | Conventional Resistance Strain Gage Sensor |
|------------------------------|--|-----------------------------|---|
| Resolution ($\mu\epsilon$) | | | |
| Dynamic | ~0.001 | 0.1 | 10–100 |
| Static | 1 | 1 | 10–100 |
| Dynamic range (dB) | 114 | 94 | ~74 |
| Bandwidth (Hz) | ~0-20,000 | ~0–360 | Variable |
| Multiplexing ability | Excellent | Excellent | Poor |
| Drift compensation | Yes | Yes | Sometimes |

DESCRIPTION:

The Naval Research Laboratory has developed a new, high-performance structural monitoring system based on interrogation of fiber-optic Bragg grating sensors. The system uses a scanning Fabry-Perot filter for demultiplexing; a Mach-Zehnder interferometer for high-resolution grating interrogation; and a unique, all-passive algorithm to interrogate a 3×3 coupler at the interferometer output for strain conversion. The system is capable of demultiplexing an array of Bragg grating sensors and can be integrated or surface mounted on various structures, including bridges, buildings, dams, aircraft, spacecraft, and industrial equipment.

ADVANTAGES/FEATURES:

- 10^{-9} strain resolution (~1-cm gage length)
- Frequency bandwidth from dc to several kilohertz
- Temperature compensation
- 114 dB dynamic range
- Readily multiplexed
- Licensable under US patent # 5,396,166

APPLICATIONS:

- Structural health monitoring
- Performance and usage tracking
- Loading history
- Adaptive structures

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